Dryden Flight Research Center
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DRYDEN CENTERWIDE PROCEDURE

CODE SH

LOCKOUT/TAGOUT

Electronically Approved by:
Associate Director

Reviewed by:
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Reviewed by:
Chief, Safety, Health, and Environmental Office

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1.0 INTRODUCTION

1.1 Purpose

This Dryden Centerwide Procedure (DCP) establishes the minimum performance requirements needed to limit hazardous exposure to energy sources during servicing or maintenance of machines or equipment at DFRC and at DFRC controlled locations.

1.2 Applicability

This DCP applies to both government and non-government personnel at DFRC and at DFRC controlled off-site operations.

1.3 Scope

This Dryden Centerwide Procedure (DCP) establishes the procedures to be followed when servicing or maintenance of machines or equipment is required and unexpected energizing, start up, or the release of stored energy could cause injury to employees. Energy sources found at DFRC that require lockout/tagout include:

- Electrical. Equipment or machines using electrical energy at or above 50 volts.
- Mechanical. Any potential or kinetic mechanical energy sources such as springs, flywheels, or rotating parts. Machines meeting this requirement include powered industrial trucks, overhead and gantry cranes, derricks, metal working machines, woodworking machines, mechanical power presses, forging machines, welding, cutting, and brazing machines.
- Compressed Air. Pressure sources at or above 150 pounds per square inch (PSI)
- Hydraulic Units. Pressure sources at or above 150 PSI
- Chemical Sources. Any toxic, corrosive, flammable, or explosive material in either a solid, dust, liquid, vapor, or gaseous state that has the potential to cause injury to an unprotected employee.
- Gas and Fluids. When under pressure or which meet the Chemical Sources definition above.
- Thermal. Any source of conductive, convective, or radiant thermal energy with the potential of causing injury.

- Radiation. Any source of ionizing or non-ionizing radiation that has the potential of causing injury.

1.4 Unable to Lockout/Tagout

Where a system, machine, or equipment cannot be locked or tagged out the servicing or maintenance supervisor will develop specific written procedures that provide a level of safety equal to lockout or tagout for the task being performed. These procedures will be submitted to the Safety Office for review and approval before work may begin.

1.5 Exceptions

Lockout/tagout procedures as listed in this DCP do not apply to:

- Tool changes, adjustments, and minor servicing activities that are part of the normal operations of the equipment or machine.
- Equipment or machines where unplugging or disconnecting from the energy source isolates the equipment or machines and where the plug or disconnect unit remains under the control of the employee performing the service or maintenance. This exception applies to pneumatic tools, hydraulic tools, and electrical equipment or machines. Stored energy must be dissipated before work may begin.
- Hot-tap operations. Before a hot-tap may be accomplished the supervisor of the hot-tap operation will submit written procedures specific to the Hot-tap task being performed to the Safety Office for review and approval.

2.0 REFERENCE DOCUMENTS

2.1 Authority Documents

NPD 8710.2B: NASA Safety and Health Program Policy. This NPD establishes the requirements for the NASA wide safety and health program and is the authority for this DCP.

29 Code of Federal Regulations Part 1910.147. The control of hazardous energy (Lockout/tagout). This document is the final authority for any lockout/tagout procedures carried out at DFRC.

2.2 Guideline Documents

ANSI Z244.1: Lockout/tagout. A good reference for what a lockout/tagout program should contain. Follows 29 CFR 1910.147 closely.

NPD 1441.1; RECORDS RETENTION SCHEDULES

3.0 DEFINITIONS

3.1 Affected Employee : An employee whose job requires him/her to operate or use machines or equipment on which servicing or maintenance is being performed under lockout or tagout, or an employee who works in an area where such servicing or maintenance is being conducted under lockout or tagout.

3.2 Authorized Employee: A person who has the authority to lockout or tagout machines or equipment in order to perform servicing or maintenance.

3.3 Capable of Being Locked Out: An energy isolating device having a hasp or other means of attachment to which or through which a lock can be affixed or which as a built-in locking device.

3.4 Energized: Connected to an energy source or containing residual or stored energy.

3.5 Energy Isolating Device: A mechanical device that physically prevents the transmission or release of energy. Some examples are:

- Manually operated circuit breakers
- Disconnect switches
- Line valves and blocks
- Devices used to block or isolate energy

Energy isolating devices must isolate the machine or equipment. On-off switch, selector switches, or control type devices may not completely cut power off to the required portion of the machine or equipment.

3.6 Lockout: Placement of a lockout device on an energy isolating device to ensure operation cannot occur until the lockout device is removed.

3.7 Lockout Device: A durable device that utilizes a positive means, such as a lock or padlock, to hold an energy isolating device in a safe position.

3.8 Tagout: The placement of a tagout device, on an energy isolation device to indicate that the isolated equipment or machinery may not be used until the tagout device is removed.

3.9 Tagout Device: A tag and a means of attachment placed on or near an energy isolation device to indicate that the isolated equipment or machinery may not be used until the tagout device is removed.

4.0 ROLES AND RESPONSIBILITIES

4.1 Overview

The chain of responsibility for ensuring that there is a safe work environment at DFRC that follows required safety standards, regulations, codes, and guidelines starts with the Center Director and flows downward through management to supervisors. In addition, each person who works at DFRC must understand that a "condition of employment" is to observe all safety specifications applicable to the task being performed.

4.2 Directorates and Single Letter Offices

Directorates and Single Letter Offices will ensure lockout/tagout procedures are adhered to within their area of responsibility.

4.3 Chief, Safety, Health, and Environmental Office

The Chief, Safety, Health, and Environmental Office has safety oversight for the DFRC lockout/tagout program and as such incurs the following responsibilities:

- Develop a lockout/tagout program for DFRC.
- Include organizational lockout/tagout activity as part of safety inspections.
- Investigate lockout/tagout accidents and incidents with line supervisors and report findings to DFRC management and required agencies.

4.4 Line Supervisors

Line supervisors are responsible for:

- Ensuring that persons who work under their supervision understand the potential hazards of the energy sources they work with.

- Ensuring that those persons who conduct lockout/tagout operations follow the requirements of this DCP.

- Providing necessary resources and training for employees who conduct lockout/tagout operations.

- Providing engineering and administrative controls where needed and keeping records of lockout/tagout activity.

- Notifying the Safety Office of any known or suspected hazards.

- Investigate lockout/tagout accidents and incidents with the Safety Office.

4.5 Authorized Employee

Authorized employees shall have required training and a thorough understanding of this DCP, 29 CFR 1910.147, and other regulations and guidelines specific to the lockout/tagout operation being conducted.

Should a situation occur whereby the authorized employee is unsure of lockout/tagout procedures he/she will obtain assistance before continuing.

5.0 TRAINING

5.1 Required Training

- Authorized Persons: Shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of energy available in DFRC workplaces, and the methods and means necessary for energy isolation and control.

- Affected Employees: Shall be instructed in the purpose and use of energy control procedures and importance of not circumventing a lockout or tagout.

- All Employees: Shall receive general training to include:

  1. Importance of not circumventing a lockout or tagout.

  2. Recognition of applicable hazardous energy sources.

  3. Type and magnitude of energy found at DFRC and in the workplace.

4. Purpose, use, and limitations of the tagout system.

5. Means and methods of isolating or controlling energy.

6. Verification of effective lockout/tagout procedures and the purpose of the procedures to be used.

5.2 Retraining

Retraining will occur when there are changes in job assignments, energy or material control procedures, equipment, or systems that present new hazards.

Retraining will be given if by inspection or by any other means it becomes apparent employees are deviating from lockout and tagout procedures or lack sufficient knowledge in the use of energy or material control procedures.

5.3 Training Certification

Each organization or contractor shall certify and keep a record of Authorized and Affected Employee's training.

6.0 LOCKOUT/TAGOUT PROCEDURES

Note. Only properly trained Authorized Employees may conduct lockout or tagout procedures.

Start procedures:

Step 1 Notification

Advise affected employees:

- that service or maintenance on equipment or machine is to be performed in their area and that lockout or tagout devices will be used.
- why lockout or tagout is being done and to not to interfere with lockout or tagout devices.
- of any unsafe conditions around the work area as a result of the lockout/tagout.

Step 2 Shutdown

Shutdown equipment or machine using normal shutdown procedures.

Step 3 Isolation

Operate the control device or devices to isolate the energy or material source from the equipment or machine.

Step 4 Lockout -Tagout (If lockout/tagout cannot be accomplished see 1.4 Unable to Lockout or Tagout

Lockout or tagout the energy or material isolating device or devices. Where possible, lockout will be used in place of tagout. Tagout must afford the same level of safety as lockout. Use the following additional procedures as required:

- If lockout procedures are to be used and equipment or machinery is out of sight of the lockout device, tagout procedures will be used until final positioning (shutdown and isolation) of the equipment or machine is accomplished and a lock is applied.
- Group lockout:
  1. Where the energy isolation device accepts multiple locks an authorized employee from each group will attach their lock. The keys to each lock will be placed in a lock box and a lock attached. The lock box will be in the sole possession of a knowledgeable supervisor who will oversee the removal of each group's lock.
  2. For single lock energy isolating devices the key to the lockout device will be placed in a lock box and each group's authorized employee will attach their lock to the lock box. The lock box will be in the sole possession of a knowledgeable supervisor who will oversee the removal of each group's lock.
- If tagout procedures are to be used the tagout device will be filled out and attached to the energy isolation device or placed in a location that is in view of the device. Use the following additional procedures as required.
- Group tagout:
  1. Group tagout is accomplished by each group placing their tagout device on the energy isolation device or placed in a location that is in view of the device.
  2. All involved groups must attach a tagout device before work may begin.
  3. If group "single tag" procedures are used, a qualified supervisor from each group must sign the tag.
- When tagout is used, further protection may be gained by:
  1. Removing an isolating circuit

2. Blocking a controlling switch
3. Opening an extra disconnecting device
4. Removing a handle or other manual control.
5. Ground electrical equipment when ever possible.

- If a shift change occurs or there is a personnel change the incoming employees will install their locks or tagout devices before outgoing employees remove theirs.

Step 5 Release Stored Energy

Stored energy such as loaded springs, elevated machine members, fluid and pneumatic pressures, electrical potential, etc., must be dissipated or restrained by repositioning, blocking, bleeding, grounding, or venting.

Step 6. Verification of Energy Isolation

- Operate the normal controls in an attempt to energize the equipment or system and verify the disconnects are effective. Caution: Be sure to turn the controls back to off or neutral position after verification.
- If verification by an attempt to operate the equipment or system is not practicable or is inappropriate, perform other tests to ensure isolation.

Step 7. Perform Servicing or Maintenance

Step 8. Lock or Tag Removal

After completion of the maintenance or servicing:

1. Remove all tools and equipment from the area.
2. Reinstall all safety equipment such as safety guards, railings, etc..
3. Ensure all activation switches or valves are in proper position.
4. Notify affected employees that work is completed and ensure they are not near the equipment or machine.
5. Remove lockout - tagout devices.

Note: For group lockout or tagout all authorized employees must agree to remove lockout or tagout devices.

6. If an authorized employee who has a lock or tag in place is not present the supervisor responsible for the work being done or who caused the lockout - tagout will:

   a. Verify that the authorized employee who applied the lock or tag is not at the facility.

   b. Thoroughly inspect the work site to ensure that the work has been accomplished and removal of the lock or tag will not result in a hazard to personnel or material.

   c. Attempt to inform the authorized employee that his/her lock or tag will be removed.

   d. Obtain responsible management authorization for removing the lock or tag.

   e. Ensure that the authorized employee is informed that his/her lock or tag has been removed before the authorized employee resumes work in the area.

Step 9. Restore Operations

Operate the energy or material isolating devices to restore the equipment or system to normal operation.

End procedures.

7.0 RECORDS

7.1 Table 1

Record	Repository	Retention	Comments
Lockout/tagout form (DFRC-26)	Line Supervisor responsible for lockout/tagout	One (1) year following tag removal	
Training Record	Technical Training Section, personnel file, or to contractor	For period of employment plus one (1) year	

APPENDIX A – Flowchart